In the Claims

Please amend page 18, line 1 as follows:

~~Claims~~ **What is claimed is:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Original) A method for producing of MR contrast agent, the method comprising the steps of:
-*obtaining* (100) a solution in a solvent of a hydrogenatable, unsaturated substrate compound and a catalyst for the hydrogenation of a substrate compound, wherein the substrate compound comprises imaging nuclei;
-*hydrogenating* (105) the substrate with hydrogen gas (H_2) enriched in para-hydrogen (p-$^1H_2$) to form a hydrogenated contrast agent;
-*exposing* (110: 705) the contrast agent to a magnetic field cycling profile adapted for enhancing the contrasting effects of the contrast agent adapted for use in an MR application, the magnetic field cycling profile comprising an initial decrease of the magnetic field followed by at least one increase of the magnetic field, said at least one increase arranged to provide a non-adiabatic (diabatic) re-magnetisation of the contrast agent.

2. (Original) The method according to claim 1 wherein the method further comprises the steps of:
-*placing* (700) a dose or part of a dose of the contrast agent in a magnetically shielded magnetic treatment chamber, with a magnetic field in the order of the earth magnetic field present within the magnetic treatment chamber at the introduction of said dose of contrast agent into said magnetic treatment chamber;
-*removing* (710) the dose or part of the dose of the contrast agent from the magnetic treatment chamber.

3. (Original) The method according to claim 2 wherein said initial decrease of the magnetic field according to the field cycling profile is from a field in the order of the earth magnetic field to a low field in the order of 1-100 nT.

4. (Original) The method according to claim 2 wherein said initial decrease of the magnetic field is performed in less than 10 ms ($10x10^{-3}$ seconds) (705.1).

5. (Original) The method according to claim 2 wherein said initial decrease of the magnetic field is performed in less than 1 ms ($1x10^{-3}$ seconds) (705.1).

6. (Currently amended) The method according to ~~claims 3 or~~ claim 1 wherein said at least one increase (705.2) of the magnetic field according to the field cycling profile is substantially slower than the initial decrease of the magnetic field.

7. (Original) The method according to claim 6 wherein said at least one increase (705.2) of the magnetic field according to the field cycling profile is at least ten times slower than the initial decrease of the magnetic field.

8. (Original) The method according to claim 7 wherein a complete field cycling profile is performed in less than 2 seconds.

9. (Original) The method according to claim 7 wherein a complete field cycling profile is performed in less than 100 ms ($1x10^{-3}$ seconds).

10. (Currently amended) The method according to ~~any of claims 1 to 9~~ claim 1 wherein the field cycling profile is described with a set of field cycling parameters and said field cycling parameters are determined by a process comprising the steps of:
-*finding* (400) the quantum mechanical density operator describing the initial spin order of the combined para-hydrogen and imaging nuclei spin system;
-*simulating* the polarisation for the imaging nuclei given a field cycling profile;
-*varying* the field cycling parameters according to an optimizing routine;
-*repeating* the simulating step and varying the field cycling parameters until the net polarisation reaches a maximum value or a desired value.

11. (Original) The method according to claim 2 wherein the method further comprises an optional step of demagnetizing the magnetic field screen (247) of the magnetic treatment chamber (246), utilizing a demagnetization circuit comprising of a demagnetization coil arranged around the magnetic shield, which together with a second coil and a dipolar capacitor forms a parallel resonance circuit, the demagnetization step comprises:

-*applying* an AC current to a demagnetization circuit for approximately 1s;
-*removing* the AC current and then letting the circuit decay for approximately 2s.

12. (Currently amended) A computer program product directly loadable into the internal memory of a processing means within a processing unit for controlling the method and apparatus for producing MR contrast agent, comprising the software code means adapted for controlling the steps of ~~any of the claims 1 to 11~~ claim 1.

13. (Currently amended) A computer program product stored on a computer usable medium, comprising a readable program adapted for causing a processing means, in a processing unit for controlling the method and apparatus for producing MR contrast agent, to control an execution of the steps of ~~any of the claims 1 to 11~~ claim 1.

14. (Original) Apparatus for producing MR contrast agent, the apparatus comprising a magnetic field screen (247) arranged around a magnetic treatment chamber (246) adapted for magnetic treatment of the contrast agent, characterized by a demagnetization circuit adapted for demagnetization of the magnetic field screen (247), which demagnetization circuit comprises of:
a demagnetization coil of about 30 turns arranged on the magnetic shield;
a second coil of about 1000 turns;
a dipolar capacitor of approximately 250 μF, which together with the second coil forms a parallel resonance circuit connected to the demagnetization coil, which resonance circuit is arranged to have a resonance frequency of approximately 50 Hz.

15. (Original) Apparatus for producing MR contrast agent, the apparatus comprising storing means for storing enriched hydrogen, wherein the storing means are essentially free from para-hydrogen relaxing material.

16. (Original) Apparatus for producing MR contrast agent according to claim 15 wherein the storing means are made of aluminum or carbon-fiber reinforced epoxy.